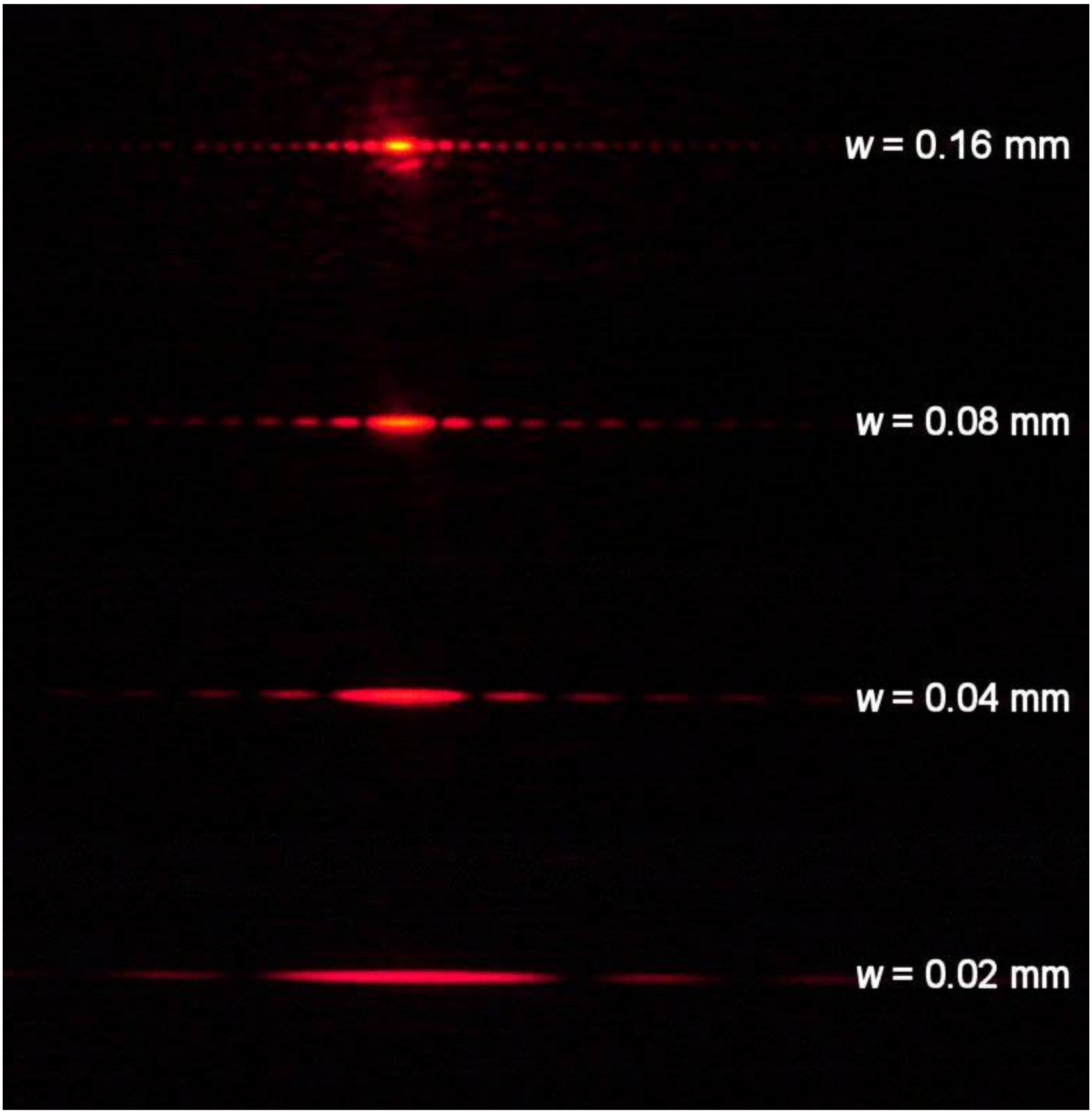
Tuesday, May 30, 2017 12:34 PM

# Single Slit interference-Ch19



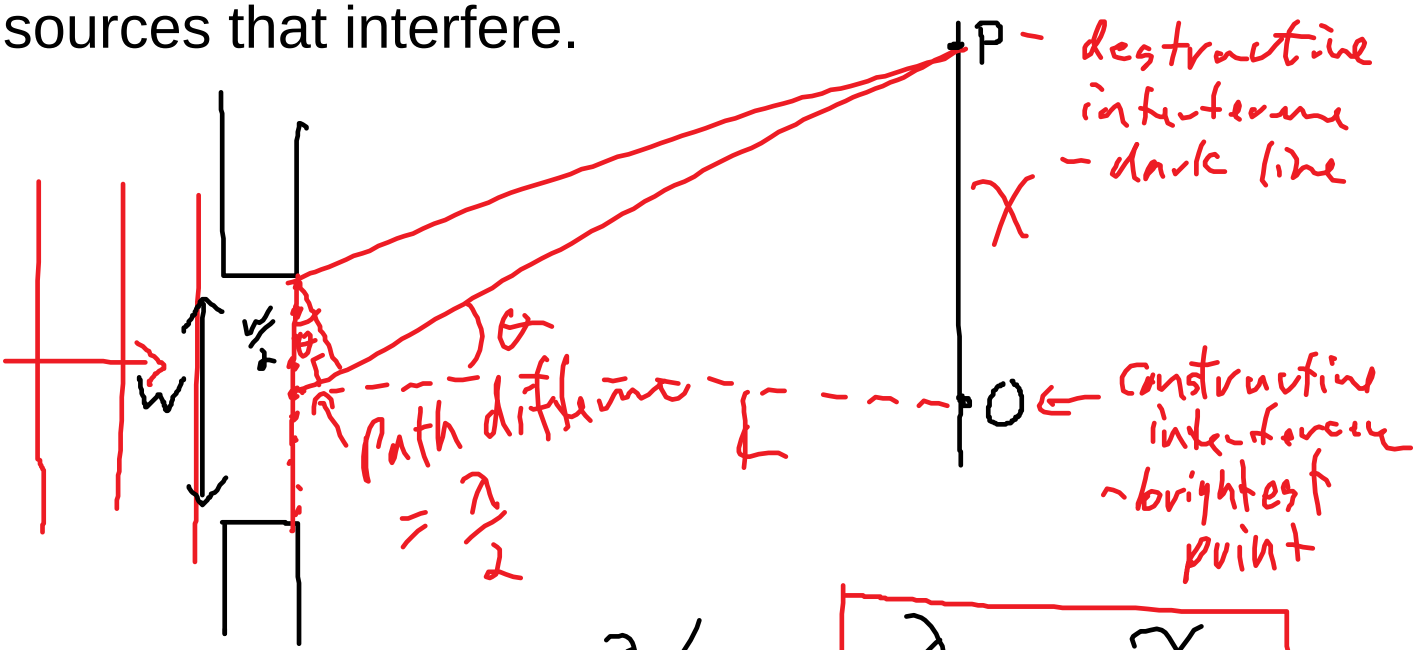

When monochromatic light goes through a single slit, width w, we observed the above diffraction and interference patterns on the screen at the back of the class.

Central Bright band

Why is there interference when there is only one slit?

Treat a wave front as an infinite set of wave sources that interfere

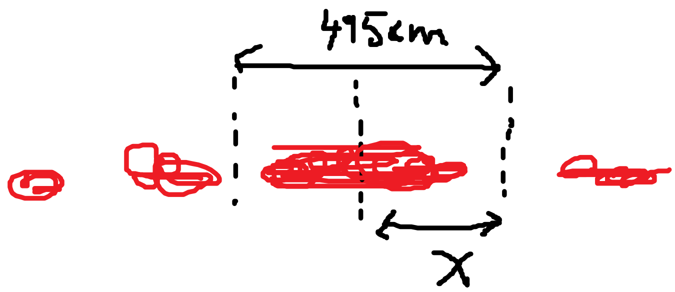
Treat a wave front as an infinite set of wave sources that interfere.




$$\sin\theta = \frac{\lambda/2}{W/2} = \frac{\lambda}{W} \simeq \frac{x}{L}$$

x is the distance from the middle of the bright spot to the first dark line

eg. You shine light with wavelength 632.8 nm through a single slit and observe the following pattern on the screen, 6.42m away.




The width of the central bright spot is 49.5cm, so x, the distance from the brightest spot to the first dark line, = 49.5/2=24.75 cm.

What is the width of the slit?

P395Q1-4 from last class

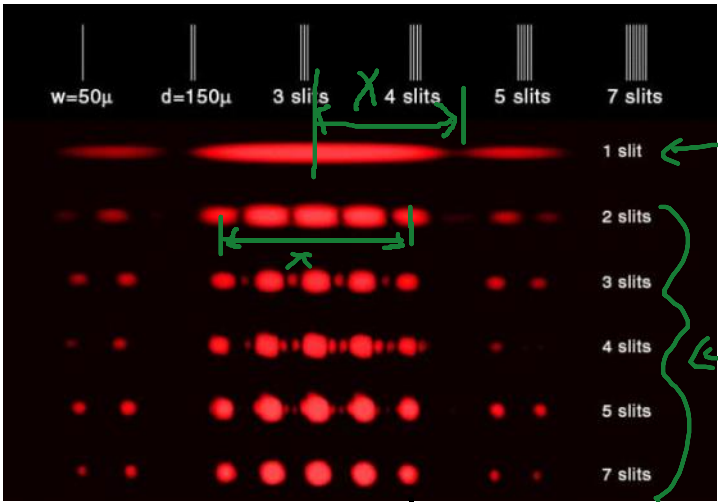
p398 Q5-8, CR 1.1-1.4, p404 Q2, 8

P395Q1-4 from last class
p398 Q5-8, CR 1.1-1.4, p404 Q2, 8
pre-read the lab sheet.

$\lambda/w = x/L$

$w = \lambda L/x = 6.328\times10^{-7}\text{m} \times 6.42\text{m}/0.255\text{m}$

$w = 1.6\times10^{-5}\text{m}$ (the slide says 0.02mm)




Note x is different for single slit vs multislit

Monday, Lab - intro relativity
Wednesday - relativity of time / space
Friday relativistic mass/energy
Tuesday June 13th optics/relativity test
Thursday June 15th, review the year.
Wednesday June 21st, review and final

$\frac{\lambda}{W} = \frac{x}{L}$ $\frac{(6.3\times10^{-7})}{w} = $

$4.045\times10^{-6} = 24.75w$ $= \frac{2475}{6.42}$

$w = 1.63 \times 10^{-5} m$ ✓ ←

on the slide, it says <u>0.02 mm</u>